

**APPLICATION OF THE FUNCTIONAL SCENARIOS  
METHOD ON ALTERNATIVE DESIGN SETTINGS.**

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Presented to  
The Academic Faculty

By

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METHOD ON ALTERNATIVE DESIGN SETTINGS.**

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## **LIST OF ABBREVIATIONS**

FSM – Functional Scenarios Method

FS – Functional Scenario

## **SUMMARY**

Goals of this study are to set up the frame-work for analyzing residential buildings using the functional scenarios method and to tests the applicability of the method on large scale projects. The metrics for the analysis are based on guidelines for designing spaces that promote healthy aging. In addition, the study was providing an opportunity to developing and refined the method.

The result of the analysis determines that the functional scenarios method is applicable to large scale buildings as effectively as small scale buildings; design configurations can be extracted from the results of the analysis to inform future designs. The limitations of the analysis are due to the available resources.

Opportunities for continued work include 1) developing standard ways of representing the results of the analysis; and 2) developing a systematic approach for extracting design configurations based on the research questions asked.



## INTRODUCTION

A method (called the functional scenarios method) has been developed that analyses multiple building plans using a set of metrics generated from the needs of users (Hadi, Lim, & Zimring, 2015). The results of the analysis are compared to understand how different design configurations effect users' needs differently. The method has been tested in two studies on small scale critical care designs.

Goals of this study are to set up the frame-work for analyzing residential buildings using the functional scenarios method and to tests the applicability of the method on large scale projects. The test projects are senior-living buildings, and the metrics for the analysis are based on principles of aging in place and principles of designing for healthy aging, which were developed based on the evidence describing the drivers of accelerated health decline that is initiated when older adults move into senior-care homes.

The result of the analysis determines that the functional scenarios method is applicable to large scale buildings as effectively as smalls scale buildings; design configurations can be extracted from the results of the analysis to inform future designs. The limitations of the analysis are due to the available resources, and because the buildings are analyzed without a determined research question. The challenge of testing a residential-type design is that the spaces, and the goals of the designs, are too generic and are not oriented to meet specific needs.

Two opportunities for future work include 1) developing standard ways of representing the results of the analysis; and 2) developing a systematic approach for extracting design configurations based on the research questions asked.

### **1.1 Drivers of Health Decline in older age.**

Residential buildings are not typically designed taking into consideration the natural decline in mobility, sensory acuity, and physical ability which occur as individuals age. The problem that older adults are facing is that they are oftentimes left alone at home, stranded in suburbia, with nothing to do and no one in their immediate surroundings that leads the same day-to-day life as them (Designing Healthy Communities, 2012). Older adults' limited physical abilities lead to accidents in environments not designed to cater to their specific needs. The unfit design of spaces can lead to accidents and injuries. These accidents are what drive older adults to move into assisted living, or other senior living communities.

Moving into senior care in a later stage in life contributes to negative aging and research has identified many of the drivers for this decline. The decline that individuals experience after relocating to a senior living facility is attributed to many physiological and psychological mechanisms (see table 1). These drivers of health decline can be prevented through the design of the environment and this paper will focus on the preventative design interventions that can positively impact health.

*Table 1 Drivers of health decline in newly relocated older adults.*

Drivers	Descriptions
<i>Inactive memory pathways</i>	A lack of neural activity in certain memory pathways (Sommerhoff, 1990; Regnier, 2012).
<i>Loss of identity</i>	Established sense of identity does not transfer to the new home
<i>Social ties severed</i>	Social ties established over time are severed or muted and this contributes to social isolation in new environments
<i>Stigma of senior living</i>	The negative stigma attached to assisted living and senior care can impact an individual's sense of self
<i>Sense of burden</i>	Needing assistance with everyday tasks can leave the individual feeling helpless and that they are a burden
<i>Loss of ownership</i>	ownership as "a direct form of spatial control. As sense of ownership increases, owner responsibility and concern for the quality of the environment often increases." (Francis, 1989)

## **1.2 Principles of Aging in Place.**

Aging in place describes a type of residential setting that is designed to accommodate for the needs of the resident as they continue to age (Centers for Disease Control and Prevention, 2013). Accidents that leave individuals requiring assisted living are accounted for and possible injuries are designed out of the spaces. In addition to preventing harm age-in-place buildings are designed around communal living; in some cases residents are cohabitating and share living rooms and kitchens and in other cases the residents have an apartment to themselves in a community that provides opportunities for social interaction and group activity. Many of the design characteristics of age-in-place homes follow the principles of universal

design (table 2.) e.g. no-step entry, single-floor living, wide doorways and hallways, low or no-threshold stall showers, etc. and the spaces themselves are designed to accommodate users with a range of mobility, physical ability, and health.

*Table 2 Principles of Universal Design (Center for Universal Design, 1997)*

1. Equitable use.
2. Flexibility of use.
3. Simple and intuitive to use.
4. Perceptible information.
5. Tolerance for error.
6. Low physical effort
7. Size and space for approach and use.

### **1.3 Designing for Healthy Aging.**

Healthy aging is defined as “the development and maintenance of optimal mental, social and physical well-being and function in older adults. This is most likely to be achieved when communities are safe, promote health and well-being, and use health services and community programs to prevent or minimize disease” (Minnesota Department of Health, 2006). Healthy aging aims to prevent and manage many of the health problems that older adults face. Advanced age can hinder working memory (Head et al., 2005) and generally decrease sensory abilities. The decline in perception and sensation can decrease social activity which ultimately negatively affect health and well-being (Frank, Engelke, & Schmid, 2003). The decrease in ability is also a driver for injury because the tools and spaces that older adults use are designed for the ability levels of younger individuals. Design should facilitate social life because maintained social life benefits health and well-being (Baltes, 1996; Dykstra, 1990; Tokama, Thompson, & Palacios, 2006), slows down the decline in physical ability (Mendes de Leon, Glass, & Berkman, 2003; Unger, Johnsons, & Marks, 1997), reduces risk of cognitive impairment (Bassuk, Glass, & Berkman, 1999), and maintains a high level of happiness and life satisfaction (Park, 2009; Thompson & Heller, 1990). The framework of healthy aging includes: 1) addressing basic needs; 2) optimizing health and well-being; 3) promoting social and civic

engagement; and 4) supporting independence (MDH, 2006). This framework can be used to inform spatial design guidelines and principles.

In this study, designs will be evaluated as to how effectively they support the needs of the residents as described by principles of healthy aging (see table 3). The principles aim to prevent health decline in assisted living facilities, and stop the mechanisms that lead to injury and to older adults requiring assisted living (e.g. the design characteristics of their homes that lead to accidents). The design functions in the principles also aim to maintain health through social life, psychological wellbeing, and positive identity.

Table 3 Principles for healthy-aging design

Design Principles	Description	References
<i>Care-free life</i>	the ability to travel independently without using a vehicle.	Buettner, 2010
<i>Design for interaction and community building.</i>	a design that creates spaces for incidental interaction.	Baltes, 1996; Buettner, 2010; Dykstra, 1990; Eberhard, 2008; Mehta, 2007; Mendes de Leon et al., 2003; Tokama et al., 2006; Ugnier et al., 1997
<i>Continued learning amenities.</i>	Access to new experiences.	Cozolino, 2008
<i>Design promoting ownership and identity</i>	allow the users to establish identity in their home and take ownership over their space.	Eberhard, 2008; Francis 1989
<i>Intergenerational interaction.</i>	interacting with people in different age groups throughout the day.	Aday et al., 1991; Dellmann-Jenkins et al., 1991; Gigliotti et al., 2005; Lambert et al., 1990; Marx et al., 2004; Perdeny, 1999; Seefeldt, 1989
<i>Exposure to nature.</i>	plant life and water features throughout the building.	Buettner, 2010; Hildebrand, 1999; Ulrich, 1984
<i>Multimodal sensory experience.</i>	Heightened sensory stimulation.	Hildebrand, 1999
<i>Healthy circadian support.</i>	being in an environment that is active in the day time and quiet at night.	
<i>Stealthcare.</i>	Healthcare embedded into the building's amenities that is non-intrusive	Gonzalez, 2008; Marsden, 2005
<i>High visibility.</i>	lighting spaces appropriately to avoid accidents.	Frank, 2002; Eberhard, 2008
<i>Defined way-finding characteristics.</i>	giving each area of the building distinct characteristics which ties into identity and ownership.	Eberhard, 2008

## **METHODS**

The FSM is used to quantitatively evaluate how design of spaces support their user needs. Understanding the needs of users allows designed spaces to be assessed as to how effectively the space allows users to meet their needs. Buildings are commonly evaluated using criteria for sustainability and cost efficiency, but the literature and the industry do not evaluate buildings on how well they meet users' needs. Two buildings will be analyzed to evaluate how their designs align with some of the principles in table 3.

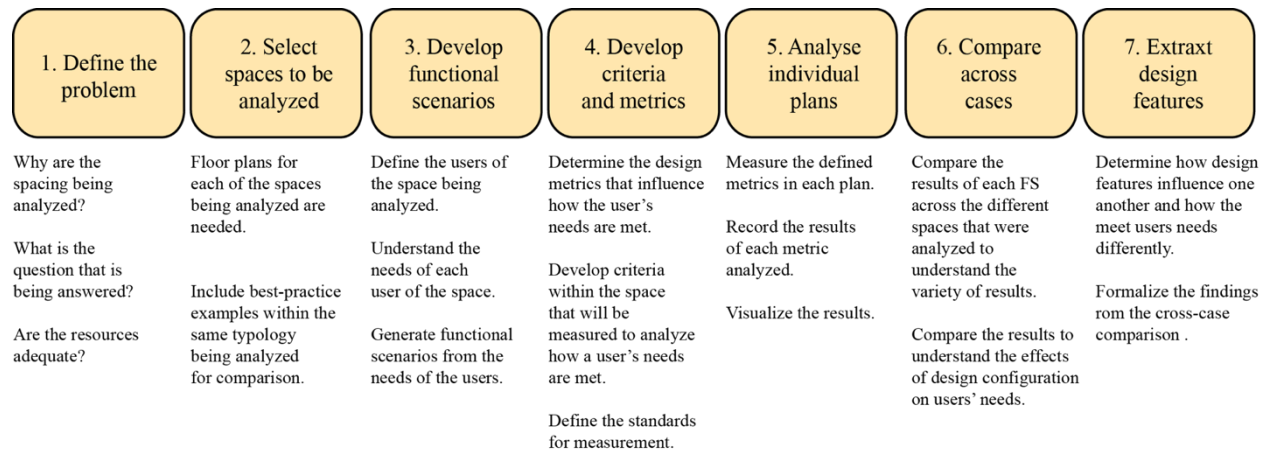
### **2.1 Overview of Functional Scenarios Method.**

Once the research problem is defined, and the spaces that will be evaluated are selected, the functional scenarios can be generated. The method uses the needs of users as a starting point to generate single line statements that describe a user and that user's need. These statements are called 'functional scenarios' (FS). The need that a FS describes is spatially driven and is typically a challenge to meet. To generate the FS, the users of the space are determined (based on the goal of the study), and their needs are understood in depth. The FS is then used to generate criteria for analysis. The criteria are the measurable characteristics within the designed space that effect how the user meets their needs. The criteria are used to indicators of how well a need is being met, and to understand how spatial design can be either a barrier or a supporter to a user meeting their need. The criteria are then used to determine a measurable metric which describes how the space will be measured. Once the criteria and metrics are determined they are used to analyze floor plans of multiple buildings using CAD software. The analyses determine how each need is met in that specific design. The results of the analysis are compared to extract design strategies on how to best meet users' needs. In addition, the results are used to inform designers how spatial components impact the needs of each stakeholder. By comparing the design features of several buildings and comparing the results of each design, conclusions can be drawn as to which design features are most effective. The knowledge gained from the comparison of results is called the design criteria.

This method has been used previously to evaluate healthcare environments (intensive care units, inpatient rooms, and neonatal intensive care units) to inform possible future designs. It has not been tested on spaces larger than a room.

## 2.2 Following the method.

The 7 steps described in figure 1 are followed to develop and generate the necessary metrics to analyze the floor plans.



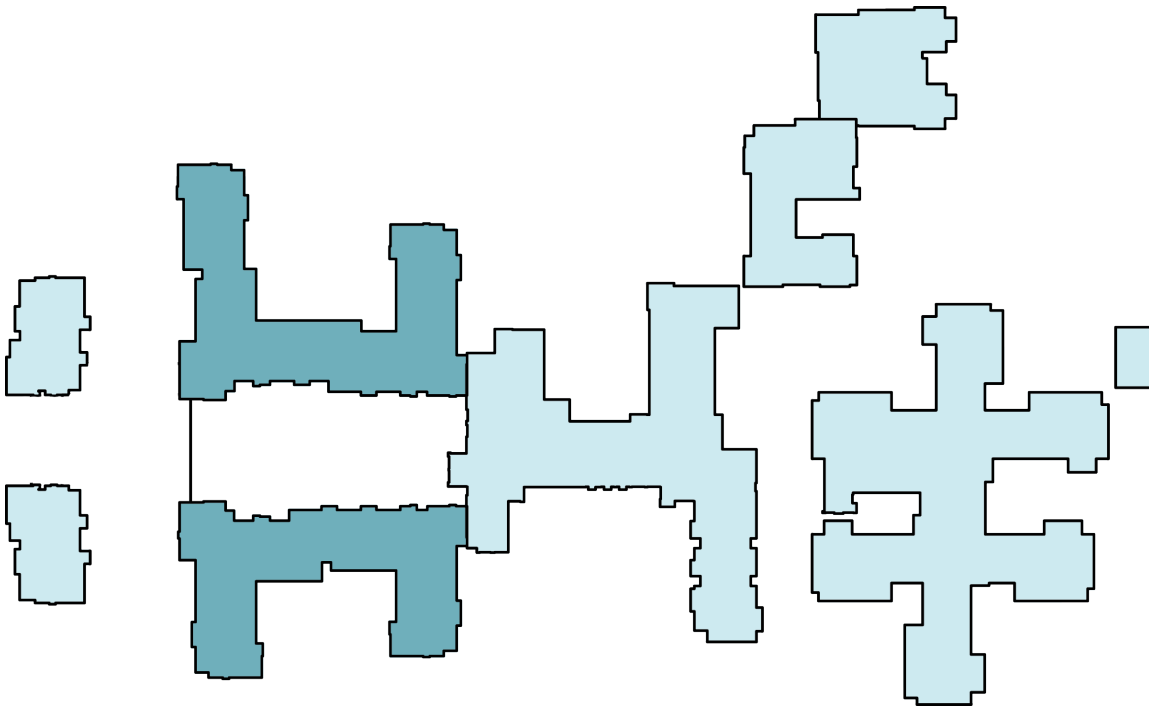
*Figure 1 The functional scenarios method involves 7 steps to analyze the design of a space and evaluate how well it meets a user's needs. (Hadi, Lim, Patterson & Zimring, 2015).*

### 2.2.1 Define the problem.

The research goal should be asking a question about design and desired outcomes. E.g. goal of the research project is to understand how the arrangement of spaces in a building affect the amount of social interaction among the residents. Setting the scope of the research will help direct the analysis and comparison of the results. The aim of this study, with regards to design and outcomes, is to test how buildings for older adults align with the design principles for healthy-aging. The primary goal of this study (to test the generalizability of the FSM in other design domains) cannot be used to narrow down the scope because the goal is not related to design and direct outcomes.

### 2.2.2 Select spaces to be analyzed.

Perkins-Eastman has provided detailed floor plans for their buildings NewBridge on the Charles (Building A) in Dedham, Massachusetts and Westminster Village (Building B) in Scottsdale, Arizona. NewBridge on the Charles is described as “an intergenerational village with a variety of housing options for [older adults]” (Perkins-Eastman) which includes 50 cottages, 24 villa apartments, 182 apartments, 51 traditional assisted living apartments and 40 memory support rooms. It includes both independent living and assisted living types of homes.

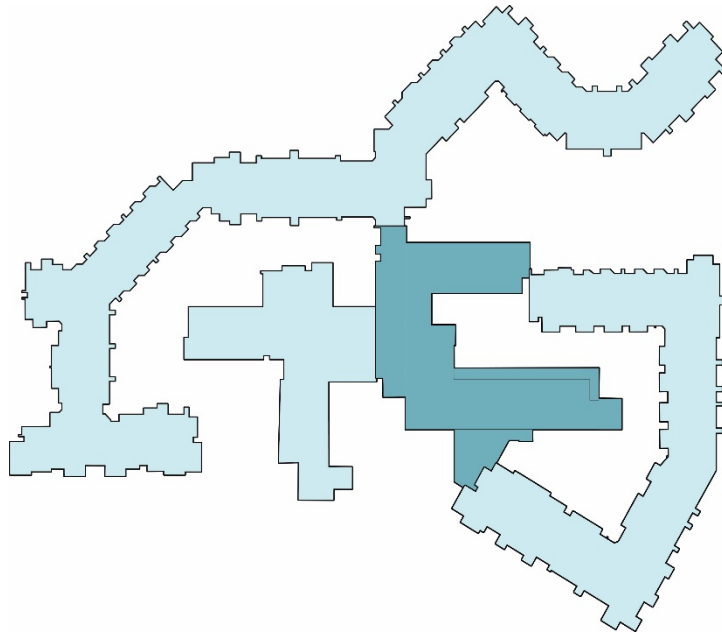


*Figure 2 Arrangement of structures at NewBridge on the Charles. The highlighted buildings will be analyzed. Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.*

The drawings provided are detailed floor layout for building D and E (highlighted in figure 2) as well as information on the arrangement of the units in buildings D, E and F. The availability of architectural drawings presents some limitations that will be later discussed.

Perkins-Eastman renovated the the Village Center Building of Building B (figure 3) which will serve as the second building for analysis. The project includes 23 assisted living apartments on the second floor and several communal spaces on the first floor. The firm provided floor plans of the building from the renovation project; the drawings detailed the first and second floor of the building. The study will not be evaluating the design of the individual units that were designed, but rather the spatial organization of the building and adjacencies of units and social spaces.





*Figure 3 Layout of the buildings in Westminster Village. The highlighted building (Village Center) is the one that Perkins-Eastman renovated. Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.*

### 2.2.3 Develop the functional scenarios.

There are 3 steps to developing the functional scenarios:

1. Define the users.
2. Determine the needs of the users.
3. Generate functional scenarios based on the determined needs.

The users for this study are residents of age-in-place buildings, and independent-living buildings. The needs of the users are determined through literature review, interviews, and observations. Based on the literature findings presented and the defined goal of this study, the determined needs will be ones that are related to the decline in health that older adults experience when they move into senior living (e.g. being socially isolated and needing social interaction, etc.):

- 1) Residents need to have access to outdoor spaces that are communal but not public. The space should be used by a group of people that are acquainted with one-another (in a similar way that residents of small neighborhoods recognize one another in public spaces). Groups of units can share an outdoor space (e.g. large balcony, or small terrace, etc) so that

the nature of the stoop or front porch is emulated. This promotes a sense of ownership, and a sense of shared responsibility.

2) Residents need opportunities for reoccurring short social interactions that are sustained over an extended period of time so that they can develop meaningful relationships with their neighbors. Multiple units sharing a threshold space will promote interaction between neighbors and provide a sense of shared identity and camaraderie.

3) In addition to accidental interaction at the unit entrance, the design configuration of the building should promote incidental interaction along circulation paths. Blurring the boundary between communal social spaces and circulation spaces will allow residents to run into one another.

4) Intergenerational interaction is a facilitator of healthy aging and is found to benefit both parties involved (Cozolino, 2008). The building should have programs and services that promote diversity of age, and the spaces that are used by different age groups should be visually accessible and integrated with one another to promote intergenerational social interaction.

#### 2.2.4 Develop criteria, metrics, and standards for measurement.

Spatial adjacency and proximity are key measures for this analysis, and those characteristics vary from unit to unit. The criteria for analysis and measurement metrics are extracted from the FS and are used as a way to quantify how a need is met. e.g. the functional scenario is a need that is linked to physical space (i.e. needing a quiet environment), the criteria for analysis are the spatial characteristics that will be measured to determine how that is supported (e.g. measuring sound), and the measurement metrics are particular way that the characteristic will be measured (e.g. decibels). In addition to criteria and metrics, the standards for measurement have to be determined. These are the additional pieces of information that affect the way in which the criteria are measured (e.g. the noise measure will be weighted with dBA and dBC). The standards for measurement ensure inter-rater reliability and replicability of the study. (see table 4 for the standards of measurement that were defined.)

*Table 4 Functional scenarios, criteria for analysis, measurement metrics, and standards developed for this study.*

<i>Functional Scenario A:</i>	A. Residents need to have access to an outdoor environment that is also used by members of their social circle.
<i>Criteria for analysis:</i>	1. Area of green space in the building. 2. Direct accessibility to exterior spaces.
<i>Measurement metrics:</i>	1.2 Total area of green space in the building. 1.2 Area of green space per unit. 2.1 Percentage of units in the building with direct access to outdoor space (including balconies). 2.2 Average number of units sharing an outdoor space.
<i>Standards for measurement:</i>	1. Green space is defined as the area of the site that is outdoors, landscaped, provides space to gather, and can be accessed from inside the building. 2.1 Access to exterior space is any physical space that the resident can occupy that is open to the natural environment. The outdoor space should be directly accessed from inside the unit. 2.2 Units that open directly onto a terrace or courtyard will be counted as sharing that outdoor space.
<i>Functional Scenario B:</i>	Residents need to develop a sense of ownership and identity over the areas adjacent to their unit, and interact with the residents that share the same space.
<i>Criteria for analysis:</i>	1. Average number of units sharing an entry threshold space. 2. Size of threshold space. 3. Units adjacent to a public space.
<i>Measurement metrics:</i>	1. number of units to the number of entry thresholds. 2. Average size of the entry threshold space. 3. Percentage of units adjacent to a public space.
<i>Standards for measurement:</i>	1. The threshold space is defined by any break in a circulation hallway's wall to indent an entrance door. 1. Instances where 2 thresholds are facing one another, the space including the hallway will be counted as 1 threshold space. 3. 'Adjacency' is a direct visual line from the entrance of the unit into the public space. 'Public space' includes any space in the building that is used open to the residents, and provides seating for more than 2 people.

Table 4 continued

<i>Functional Scenario C:</i>	Residents need to have social interaction that is not premeditated (e.g. when walking through the building)
<i>Criteria for analysis:</i>	1. Number of social/communal spaces in the building. 2. Encounter of open social spaces on route to the living unit.
<i>Measurement metrics:</i>	1. Total number of communal/social spaces 2. Average number of open social spaces crossed on the shortest route from the building entrance to the unit door.
<i>Standards for measurement:</i>	Open social spaces are spaces that are open directly onto the adjacent space (there is no wall that separates or defines the space.)
<i>Functional Scenario D:</i>	Residents need to interact with people of different age groups
<i>Criteria for analysis:</i>	1. Functions/service for different age groups. 2. Integration of the multi-generational spaces with the residents' social and circulation spaces.
<i>Measurement metrics:</i>	1. Number of age groups that use the building. 2.1 Integration analysis between the multi-generational spaces and the social/communal spaces of the building 2.2 Integration analysis between the multi-generational spaces and the circulation spaces of the building.
<i>Standards for measurement:</i>	The age groups - 1. daycare age, 2. children, 3. teenagers, 4. college age, 5. young adults, 6. middle aged. Multi-generational function includes daycare, reoccurring organized visits from a younger group, recreational spaces that are open to the public, retail spaces open to the public, etc.

It should be noted that when defining the measurement metrics and criteria for measurement, the terminology can influence the analysis outcome. It is more useful to have results on a scale than as binary results. This allows for a wider range of analyses. (e.g. when measuring for integrational amenities, a wider range of ages meets the users need more effectively than a large population of one age group; number of intergenerational spaces can be

5, but all 5 could be of the same age group. Discrete categories of age ranges should be determined for this metric).

#### *Defining the metrics.*

Functional Scenario A – defining greenspace: The green spaces are defined by the boundary of an outdoor, communal space that is accessible from a resident's hallway or apartment. In addition, the green space should be designed to allow residents to spend extended time there (e.g. with benches, tables and chairs, etc.).

#### 2.5 Analyze individual plans.

The floor plans of the buildings are measure in CAD software, and the results of the measurements are visually represented for comparison (see figures 4 – 9). During the analysis step, issues will become present that need addressing or noting – in some cases these issues influence the measurement of the criteria (e.g. building A drawings did not include a detailed plan of the courtyard garden, and so the entirety of the space in-between the two buildings was used for this metric) and in other cases they may provide the first step toward extracting design criteria (e.g. building A is accessed directly from a basement parking. This influences the way that residents use circulation spaces that are further than the elevator). Recording and presenting these findings during the analysis can highlight possible areas for improvement, or potential areas that need to be further researched (e.g. both buildings have scheduled visits from different age groups but the criteria of FS D are not applicable, and cannot be measured because the visitors do not have a permanent space in the building.)

#### 2.6 Compare across cases.

There is a clear contrast between the two buildings. Building A has a large courtyard, individual private balconies, smaller entry thresholds, and direct access to vertical circulation without crossing any public spaces. Building B has multiple smaller terraces, no private outdoor space, clustered entrance thresholds, and only one location for elevators that are accessed through a public space.

#### 2.7 Extract design criteria.

The extracted design criteria are *lessons learned* from the analysis that can inform future design decisions where the goal of the design is to meet specific user's needs. The goal of the research needs to be clearly stated so that after the analysis is complete, the comparison of the projects is informative. The Research goals and defined user-needs pose a question regarding the influence of spatial design on users. The results of the analysis are compared to understand

how a design decision (e.g. locating the elevators to be very highly integrated) influences outcomes (e.g. residents do not cross paths as often because the elevators are very accessible); e.g. using the same set of metrics to analyze multiple designs and comparing those results will present the effects of different designs. The goal of the method is not to rank the designs, rather it is to understand how different designs meet the same goals differently.

## **RESULTS**

The results for functional scenario D (residents need to interact with people of different age groups) were inconclusive as to how effectively the design of the building meets that need.

Building A gives residents more personal space, efficient circulation, and large landscape. These design features of the building also lower the possibility of social interaction.

The elevators in building A are located with high connectivity, but the ease of access to the elevators reduces interaction; the results of FS C show that residents in building A do not encounter public spaces whereas residents in public B encounter 4.6). FS A shows, similarly, that access counters social opportunities.

Further study of the distance of entry/exits to the floor might show interesting results. building A has 2 elevators in each building that are apart from each other and building B has 2 elevators that are adjacent therefore the residents of building A are divided into two groups (based on which elevator they use) whereas residents of building B all travel to the same area to access the elevator. The proximity of vertical circulation could inform the arrangement of social space; a space that is located close to an elevators core will gain more traffic (and more incidences of chance encounter among the residents) if it is the only elevator core.

*Table 5 - Results of the analysis*

Criteria and Metrics	NewBridge	Westminster
<i>A 1.1) Total area of green space in the building.</i>	1.1) 33,650 sqft	1.1) 11,103 sqft
<i>A 1.2) Area of green space per unit.</i>	1.2) 179 sqft	1.2) 482.7 sqft
<i>A 2.1) Percentage of units in the building with direct access to outdoor space (including balconies).</i>	2.1) 80%	2.1) 0%
<i>A 2.2) Average number of units sharing an outdoor space</i>	2.2) 1 unit	2.2) 5.75 units
<i>B 1) number of units to the number of entry thresholds</i>	1) 1.49 units	1.1) 3.3 units
<i>B 2) Average size of the entry threshold space</i>	2) 29.6 Sqft	2) 46 sqft
<i>B 3) Percentage of units adjacent to a public space.</i>	3) 7.5%	3) 0%
<i>C 1) Total number of communal/social spaces</i>	1) 7	1.) 14
<i>C 2) Average number of open social spaces crossed on the shortest route from the building entrance to the unit door.</i>	2) 0	2) 4.6 spaces
<i>D 1) Number of age groups that use the building.</i>	1) 3 groups	1) 1 group
<i>D 2.1) Integration analysis between the multi-generational** spaces and the social/communal spaces of the building</i>	2.1) NA	C 2.1) NA
<i>D 2.2) Integration analysis between the multi-generational spaces and the circulation spaces of the building.</i>	2.2) NA	C 2.2) NA

A. Residents need to have access to an outdoor environment that is also used by members of their social circle.

*1.1 Total area of green space in the building: **33,650 sqft***

*1.2 Area of green space per unit: **179 sqft***

*2.1 Percentage of units in the building with direct access to outdoor space (including balconies): **80%***

*2.2 Average number of units sharing an outdoor space: **1 units***



*Figure 4 Results of functional scenario A on NewBridge of the Charles.  
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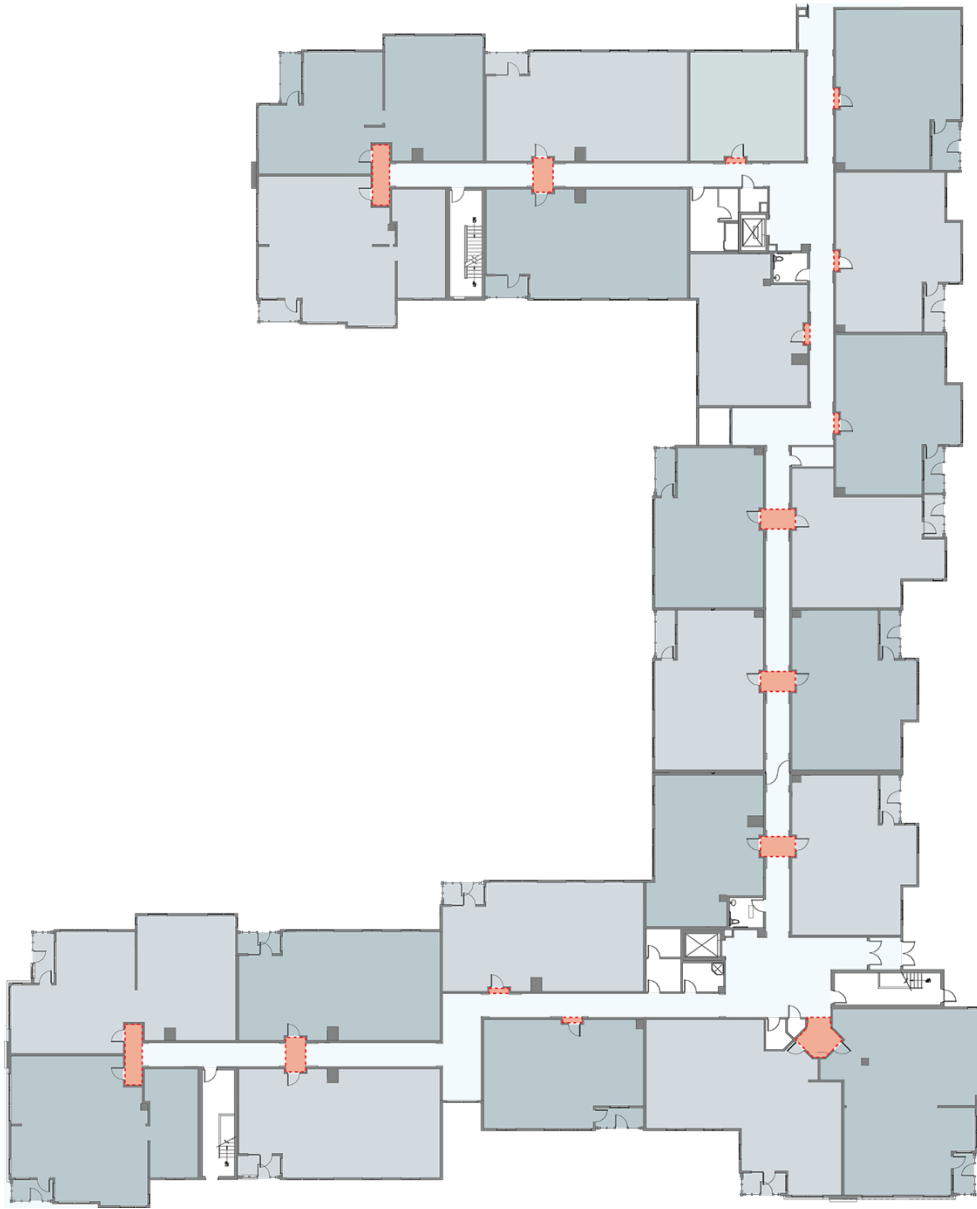


B. Residents need to develop a sense of ownership and identity over the areas adjacent to their unit, and interact with the residents that share the same space.

1. number of units to the number of entry thresholds: **1.49 units**

2. Average size of the entry threshold space: **29.6 sqft**

3. Percentage of units adjacent to a public space: **7.5%**

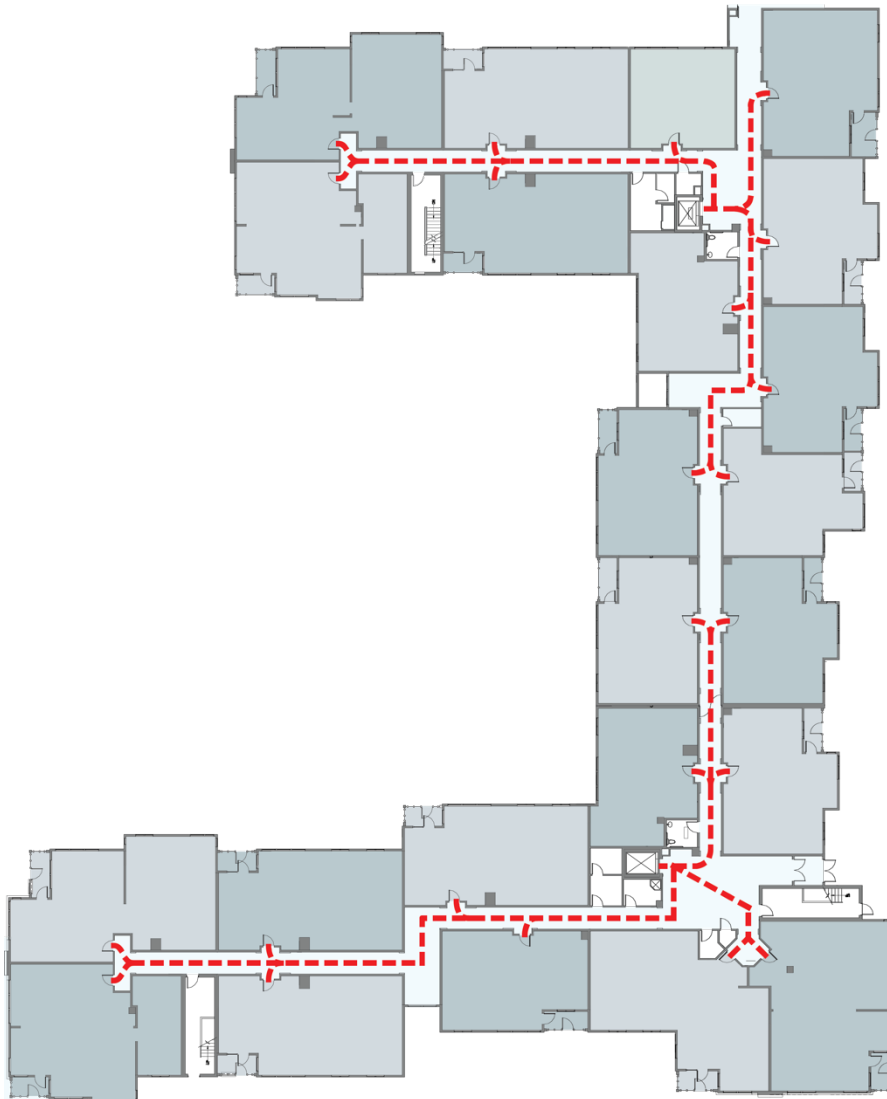


*Figure 5 Results of functional scenario B on building A (NewBridge on the Charles).  
Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.*

C. Residents need to have social interaction that is not premeditated (e.g. when walking through the building).

*1. Total number of communal/social spaces: 7*

*2. Average number of open social spaces crossed on the shortest route from the building entrance to the unit door: 0*



*Figure 6 - Results of functional scenario B on building A (NewBridge on the Charles)  
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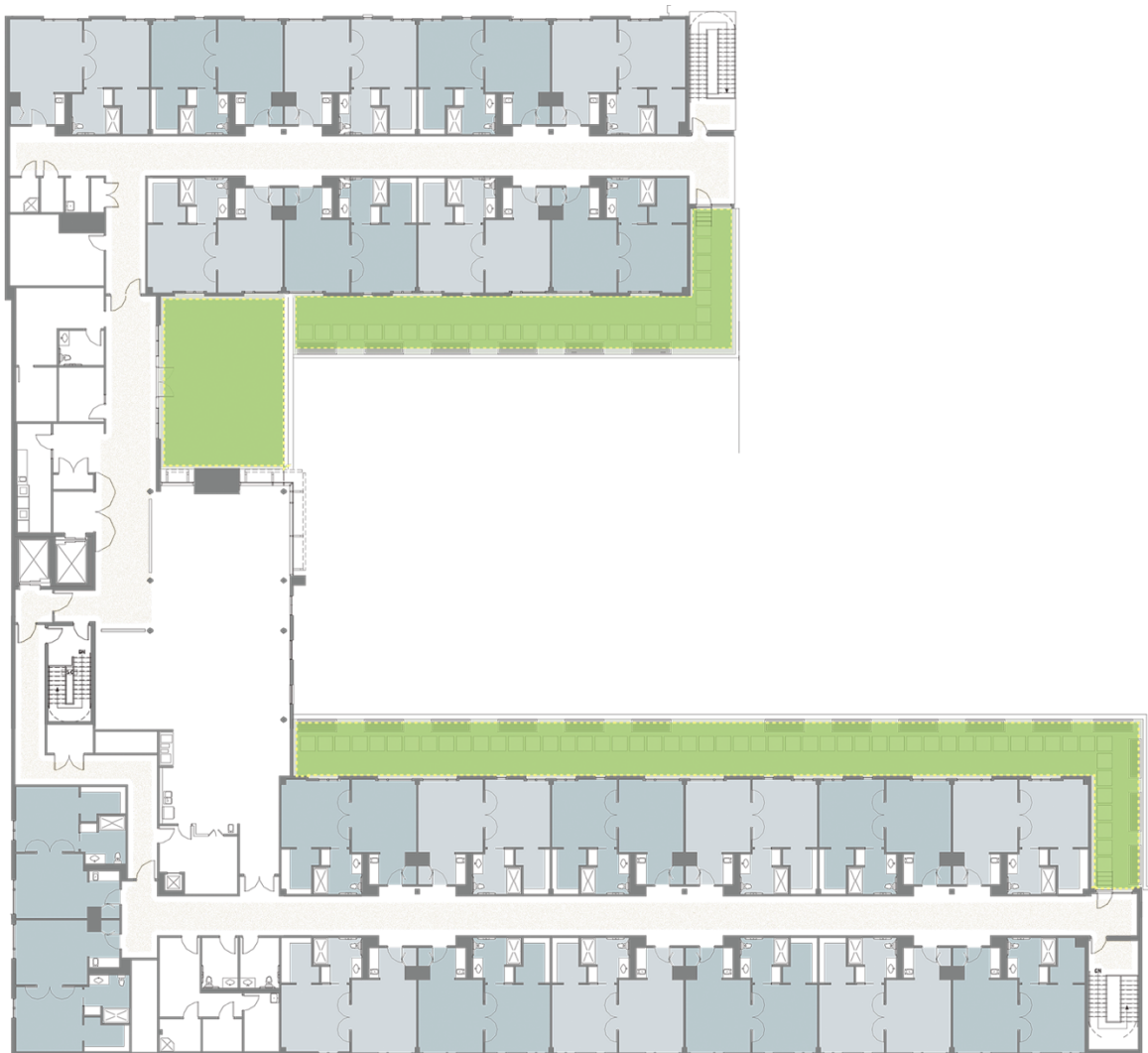
Residents need to have access to an outdoor environment  
that is also used by members of their social circle.

*1.1 Total area of green space in the  
building: **11,103 sqft***

*1.2 Area of green space per unit: **482.7 sqft***

*2.1 Percentage of units in the building with  
direct access to outdoor space (including balconies): **0%***

*2.2 Average number of units sharing an outdoor space: **5.75 unit***



*Figure 7 Results of functional scenario A on building B (Westminster Village). Includes only 1st floor. Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.*

B. Residents need to develop a sense of ownership and identity over the areas adjacent to their unit, and interact with the residents that share the same space.

1. number of units to the number of entry thresholds: **3.3 units**
2. Average size of the entry threshold space: **46 sqft**
3. Percentage of units adjacent to a public space: **0%**



*Figure 8 Results of functional scenario B on building B (Westminster Village). Includes 1st floor only. Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.*

C. Residents need to have social interaction

that is not premeditated (e.g. when walking through the building).

1. Total number of communal/social spaces: **14**
2. Average number of open social spaces crossed on the shortest route from the building entrance to the unit door: **4.6**

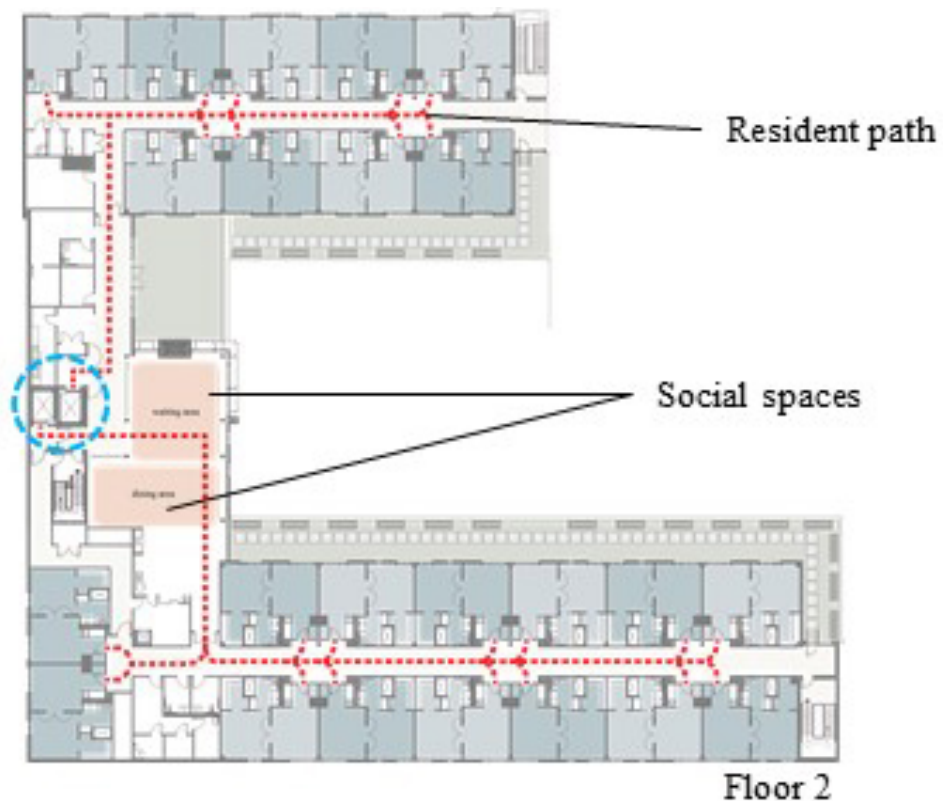


Figure 9 Results of functional scenario C on building B (Westminster Village). Includes only 2nd floor. Copyright Perkins Eastman. Plans provided courtesy Perkins Eastman.

C. Residents need to have social interaction

that is not premeditated (e.g. when walking through the building).

1. Total number of communal/social spaces: **14**
2. Average number of open social spaces crossed on the shortest route from the building entrance to the unit door: **4.6**

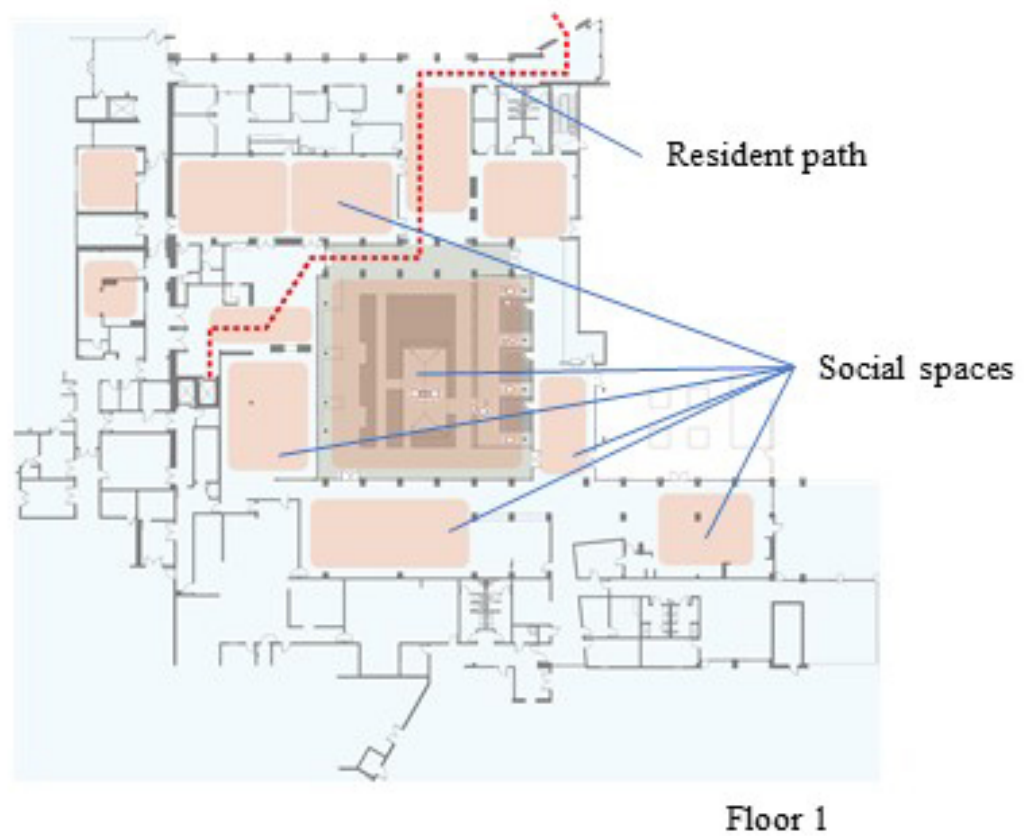


Figure 10 Results of functional scenario C on building B (Westminster Village). Includes only 1st floor

## **DISCUSSION**

Building A's elevators are placed in very efficient places, but the ease of access to circulation reduces interaction; the results of FS C show that residents in building A do not encounter public spaces whereas residents in public B encounter 4.6). FS A shows, similarly, that access counters social opportunities. The units in Building A are more spread out and this lead to lower integration. There is a specific point in the plan where two neighbors would never even have to meet because the elevators closer to each are in opposite directions. (Figure) Further study of the distance of entry/exits to the floor might show interesting results. building A has 2 elevators in each building that are apart from each other and building B has 2 elevators that are adjacent therefore the residents of building A are divided into two groups (based on which elevator they use) whereas residents of building B travel to the same area to access the elevator. The proximity of vertical circulation could inform the arrangement of social space; a space that is located close to an elevators core will gain more traffic (and more incidences of chance encounter among the residents) if it is the only elevator core.

Students from the school on Building A's campus visit the residential building often and the residents of the building frequently teach at the school. Intergenerational social events support the user's need for intergenerational interaction, but there are opportunities for design to incorporate different age groups more consistently e.g. providing a daytime children's care service where the residents are employed.

Extracting design criteria is the part of the method that informs future designs, and as it is now, the way that the design criteria/configurations are extracted leaves too much up to the discretion of the researchers. This present an opportunity to develop a systematic approach that could exhaust all the possible correlations of the differences in design with the difference of results.

## **CONCLUSION**

Based on this study, it can be concluded that the FSM is applicable on the whole-building scale, and it is as effective as it is on small-scale, single-room assessments. The challenge in analyzing large scale buildings using this method is determining the standards for measurement. In large scale buildings, many of the standards became defined during the first road of analyses because the size of the criteria was very large.

Based on this study, functional scenarios are applicable to residential settings if the users are defined, and their needs are challenging to meet. Functional scenarios are effective in healthcare settings because the needs of the different stakeholders are straight forward. The users and their needs are very clearly defined, and very contrasting.

The value of the functional scenarios method is its use as a tool to inform design practitioners. Comparing multiple designs for a similar type of project (e.g. independent senior living homes) can help designers understand the implications of design decisions on the users of the building (e.g. the placement of elevators influences the frequency of incidental interaction). Comparing the analysis results of multiple projects can also help designers make design decisions. When a specific goal is in mind, comparing projects can shed light on how to meet that goal effectively. The goal of the method is not to rank the designs, rather it is to understand how different designs meet the same goals differently.

The functional scenarios method should continue to be used draw correlations between different design strategies and their effects on how users use the space. In addition, the database can gather data on the tradeoffs that a design strategy presents (how a design can improve one need, but inhibit another). For this database to become a reality, the method needs to be continuously tested.



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